

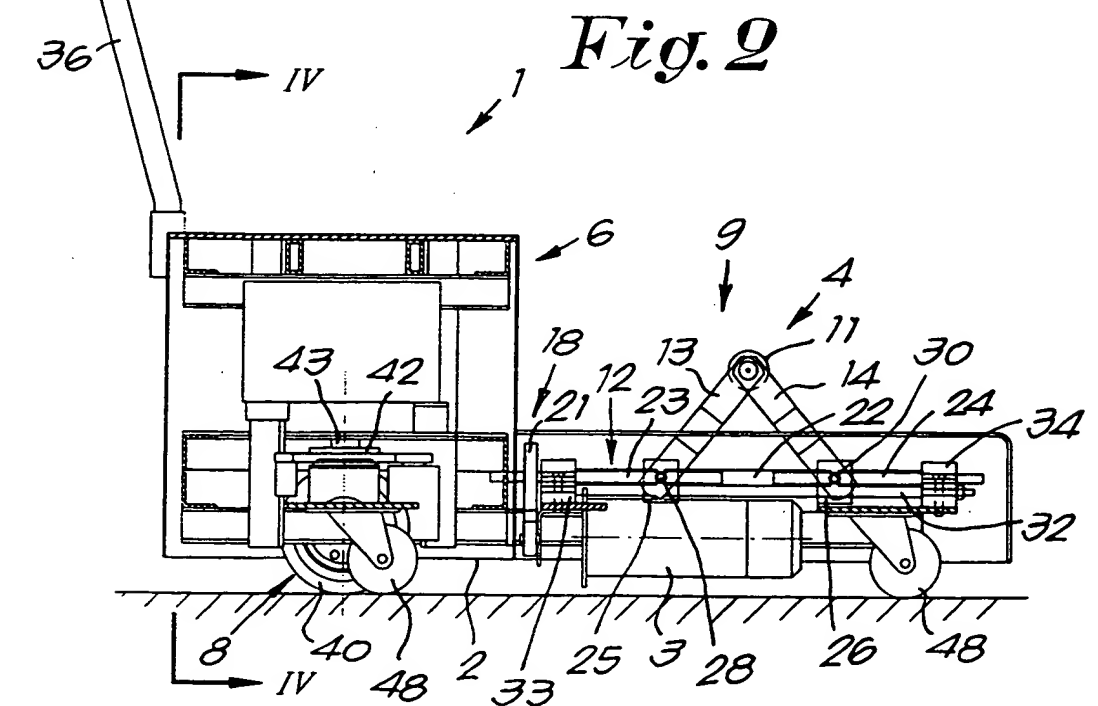
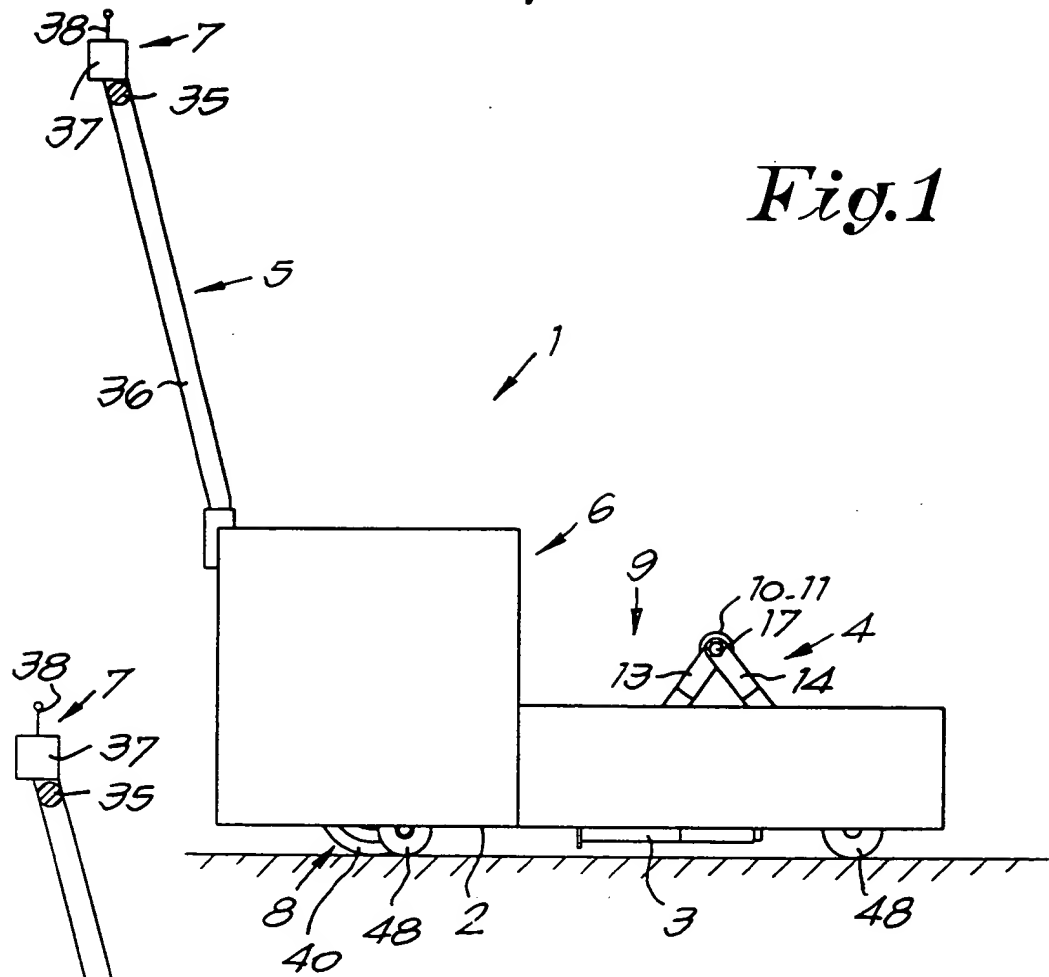
⁽¹²⁾ UK Patent Application ⁽¹⁹⁾ GB ⁽¹¹⁾ 2 285 393 ⁽¹³⁾ A

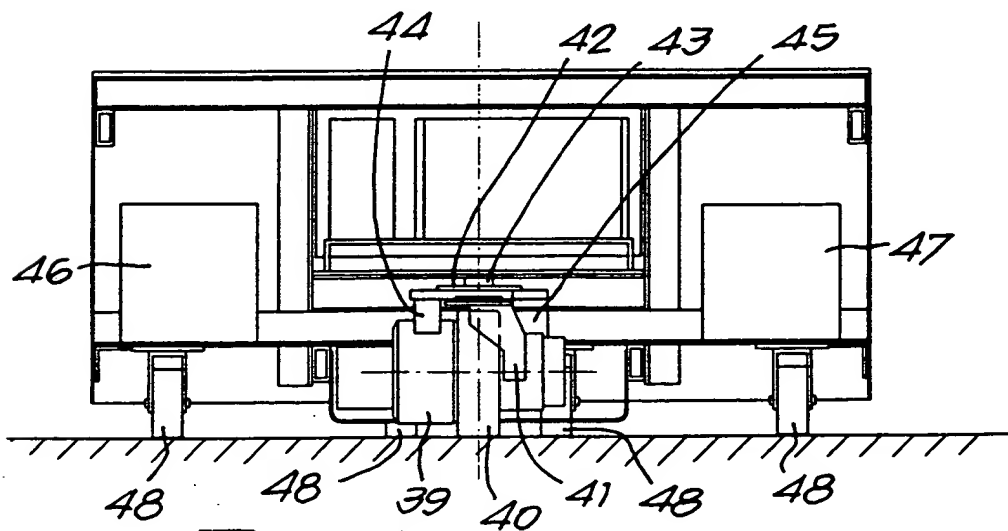
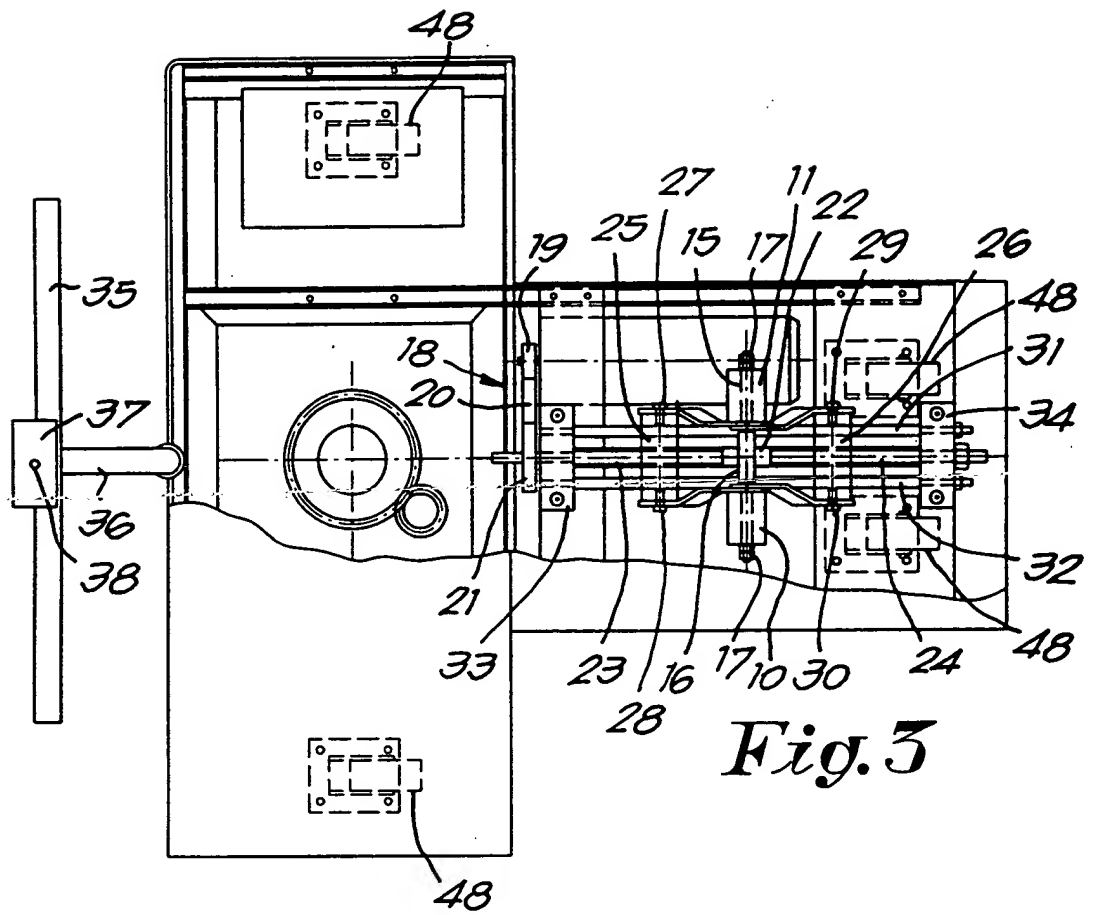
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Fig. 5

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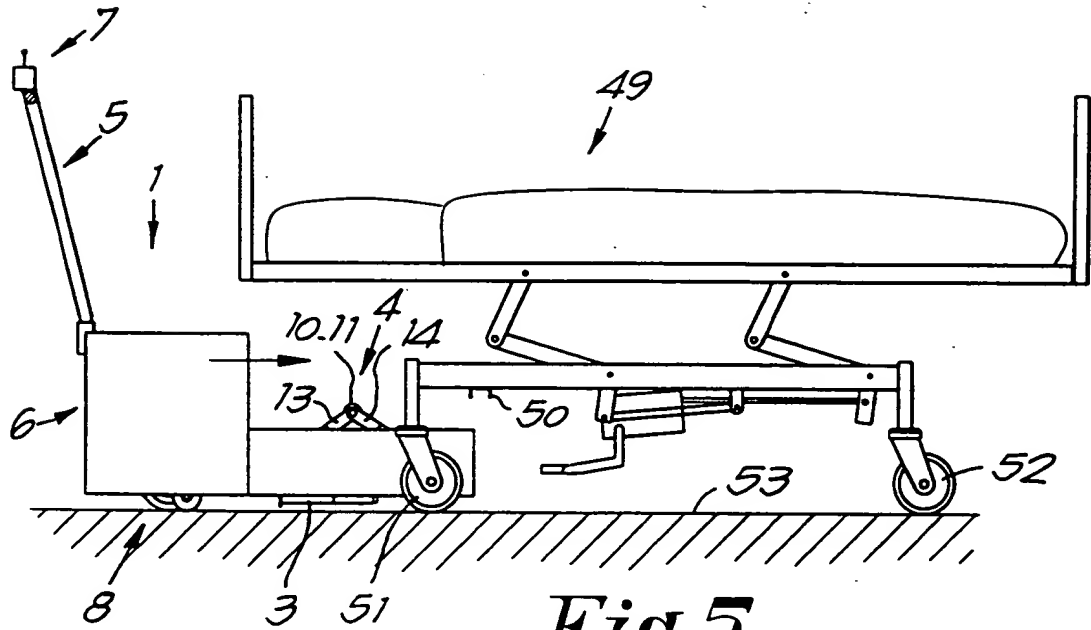


Fig. 5

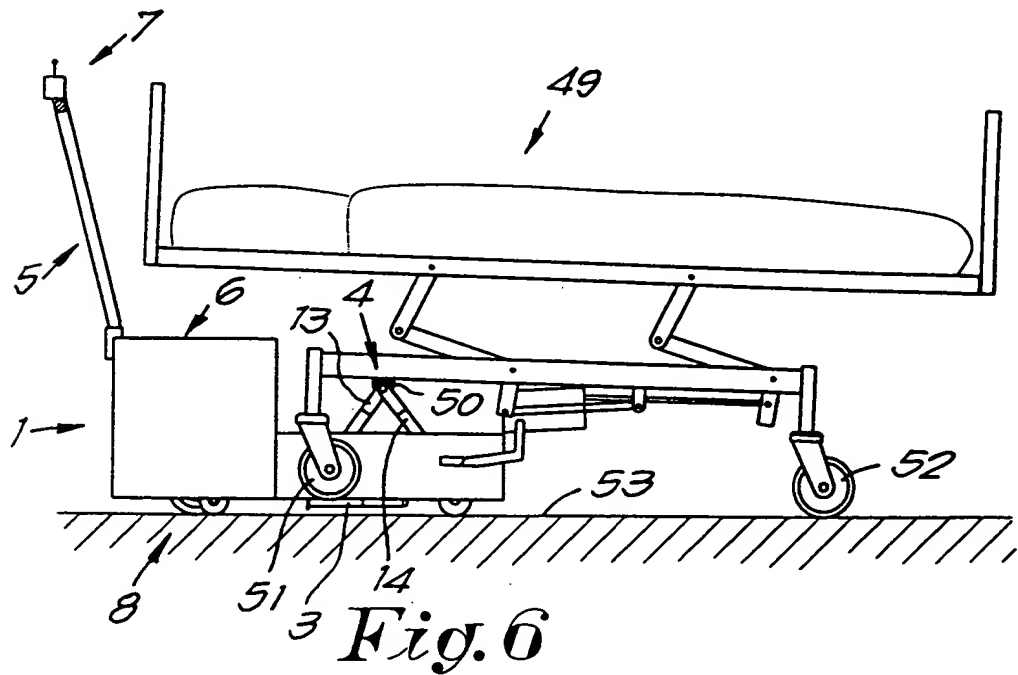


Fig. 6

Device for moving beds.

5 The present invention concerns a device for moving beds, in particular beds on wheels, as are used for example in hospitals, homes for the elderly and such like.

10 The problems occurring during the removal of a bed whose frame rests on four wheels which can each turn 360 degrees around a vertical axis are known. Such beds are indeed difficult to steer, which has for a result that the planned course is often departed from resulting in walls, doors and such being hit and damaged. Usually,
15 two persons are required to move the bed, given the physical power needed.

Also, the present invention aims a device for moving beds, in particular the above-mentioned beds, which
20 totally excludes said and other disadvantages. In other words, said bed can be moved such that it follows only the desired course, so that damages to walls, doors and such can be entirely avoided. Moreover, the steering requires practically no physical effort.

25 To this end, the invention consists of a device for moving beds which is mainly formed of a moveable frame; a lifting mechanism which can be connected to the underframe of a bed; and a steering mechanism.

30 This device is indeed perfectly steerable when the bed is pushed ahead or drawn at.

If required, the device can also be guided along a fixed

trajectory from which it cannot divert unless the person steering it wants it to do so, either because the wheels are guided in grooves or such provided in the ground, either because means are provided in or on the floor which can for example be scanned magnetically, by means of infrared, laser, CCD or such.

In order to better explain the characteristics of the invention, the following preferred embodiment of a device for moving beds is described as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 shows a side view of a device according to the invention;
figure 2 shows a longitudinal section to a larger scale of the device according to the invention;
figure 3 shows a top view with a partial cut-out of the device according to figure 2;
figure 4 shows a section according to line IV-IV in figure 2;
figures 5 and 6 depict the use of a device according to the invention.

As shown in the figures, a device 1 for moving beds or such according to the invention mainly consists of a mobile frame 2; on the frame 2 a lifting mechanism 4 preferably driven by a motor 3 which can cooperate with an object to be lifted, in particular the underframe of a bed; and a steering mechanism 5 with which the device 1 can be moved and directed in the required direction.

The frame 2 consists of a first part 6 which contains the steering mechanism 5 which consists of a steering unit 7

and a drive 8 and of a second part 9 which is made lower and narrower than the first part 6 and which contains the lifting mechanism 4.

- 5 The lifting mechanism 4, which is mounted in the front part of the frame 2, mainly consists of at least one pressing element which can be moved in a vertical plane made up of rollers 10-11 and which is controlled by means of drive means 12.

10

- These drive means 12 mainly consist of two pairs of hinged arms 13-14 which are mounted freely rotatable on a common shaft 15 upon which also the rollers 10-11 are mounted freely rotatable, whereby an intermediate bush 16 is provided to keep the pairs of arms 13-14 at a distance and whereby the rollers 10-11 are maintained in place by means of nuts 17, and a motor 3 which drives the above-mentioned arms via a transmission 18.

- 20 Preferably, each pair of arms 13-14 has a bent profile, one and other such that both ends of each arm run parallel to one another, but are shifted sideways in relation to one another.

- 25 According to another embodiment, which is not represented in the drawings, the lifting mechanism 4 may be equipped with a pressing element which may be possibly made wider.

- 30 The above-mentioned transmission 18 consists of a number of meshing gear wheels 19-20-21 and/or geared belts which transmit the torque of the motor 3 on a horizontal rod 22 which consists of two parts, 23 and 24 respectively, which are each formed of outside thread.

On part, for example 23 of the rod 22 hereby has a right-handed screw thread whereas, in this case the second part 24 has a left-handed screw thread, preferably with the same pitch.

5

On each part 23-24 of the rod 22 is provided a nut, 25 and 26 respectively, in this case in the shape of a cross beam with which, via pivots 27-28 and 29-30, the ends of the pairs of arms 13, 14 are connected freely rotatable.

10

Bore holes are further provided in the nuts 25-26 with which guides 31-32 cooperate which are fixed with end pieces 33-34 which are in turn appropriately connected to the frame 2.

15

It is clear that the lifting mechanism 4 is not limited to the embodiment described above and represented in the accompanying drawings with an electric drive, but that also other drives are possible, such as a manual drive, which makes use for example of a crank with which the horizontal rod 22 can be driven directly or via a transmission.

The steering unit 7, situated at the height of the first part 6 of the frame 2, mainly consists of a rod 35 which can function as a handle and an almost vertically directed, fixed steering rod 36 which connects the rod 35 to the frame 2 of the device 1.

On the rod 35 is provided a control panel 37 with steering handle 38 which can be either moved or not.

The drive 8 of the device 1, as represented in the figures 2, 3 and 4, mainly consist of an electric driving

motor 39 which can drive a bearing roller 40.

5 This bearing roller 40 is preferably made of a material with a large coefficient of friction and is bearing-mounted in a foot 41 which is in turn connected to a steering gear 42 which is fixed on a vertical shaft 43 which itself is bearing-mounted in a freely rotatable manner in the frame 2.

10 The housing of the driving motor 39 is fixed to the steering gear 42 for example by means of a connecting piece 44.

15 The rotation of the steering gear 42 takes place as represented in the figures 2 and 3 under the influence of a steering motor 45 whose outgoing shaft is equipped with a gear wheel which meshes with the steering gear 42 and which can receive a signal from the steering unit 7 in order to obtain, depending of the position of the steering handle 38 on the control panel 37, that the
20 steering gear 42 is driven in one sense of rotation or the other.

25 The power required for the drive of the above-mentioned motors is supplied by preferably two chargeable batteries 46-47 which are situated in the above-mentioned first part.

30 It is clear that the invention can be driven both electrically and manually, for example by setting up the steering rod 36 with the accompanying rod 35 in a rotatable manner, whereby the position of the bearing roller 40 is influenced either directly or via a transmission.

According to another embodiment which is not represented in the drawings, also the driving motor 39 can be replaced by human pushing force, whereby the user will push the device according to the invention ahead or draw at it by means of the steering rod 36.

Further, the frame 2 is also equipped with four support wheels 48.

As represented in the figures 5 and 6, a bed 49 which is meant to work in conjunction with a device according to the invention, will be preferably equipped at the bottom side with a reversed, U-shaped element 50, provided diagonally, with which the device according to the invention can cooperate.

It is clear that also other couplings between the device according to the invention and a bed are possible and that the device is thus not restricted to the pressure rollers represented in the figures which can cooperate with a reversed, U-shaped profile, but that any form of cooperation whatsoever between the lifting mechanism 4 and a bed underframe is possible.

Also, it is self-evident that the device according to the invention, instead of being made separately, can also be fully integrated with a bed.

In this case, every bed will be equipped at the bottom with its own device according to the invention, such that this bed can be moved immediately at any time, whereby also in the latter case the bed can be steered manually, semi-automatically or fully automatically.

The use and operation of the device according to the invention is very simple and as follows.

As represented in figure 5, a device 1 for moving a bed with the lifting mechanism 4 can be brought between the two front support wheels 51 of a bed 49 in downward position, which is possible because the second part 9 of the frame 2 is made lower and narrower than the first part 6.

10

Hereby, the device according to the invention with the above-mentioned rollers 10-11 is brought to right under the above-mentioned reversed, U-shaped element 50.

Subsequently, by exciting the motor 3, the rod 22 will be rotated via the gear wheels 19-20-21 and/or geared belts, as a result of which the nuts 25-26 shift over the horizontal guides 31-32 and move towards each other.

Consequently, the two rollers 10-11 will be pushed upward in the reversed, U-shaped element 50 by the arms 13-14, as a result of which the bed 49, as represented in figure 6, is lifted with its two front support wheels 51 from the floor 53.

25

The element 50 hereby makes sure that a further relative movement between the lifting mechanism 4 and the bed 49 is hindered.

Because the bed 49 only rests on the floor with the rear support wheels 52 which have not been lifted yet, the entire bed 49 can be moved thanks to the movement of the device 1 according to the invention, whereby the support wheels 52 become follow-on wheels, one and other such

that the bed perfectly follows the path which is taken by the device according to the invention. The steering of the whole of the device and the bed hereby takes place by moving the steering handle 38 on the control panel 37.

5

Because the accompanying person usually walks behind the device according to the invention with the bed, the control panel 37 is preferably placed in a detachable manner on the rod 35, whereby a connection remains, however, between the device and the control panel 37 by means of a cable or, in another variant, by means of radio waves, infrared or such like.

10

It is clear that, as a result, the accompanying person can walk behind the device with the bed and still can guide the whole in the right path by means of the control panel 37.

15

According to a variant, grooves and/or markings which can be identified magnetically, by means of infrared, laser, CCD or such can be provided on or in the floor, in particular in the bends of corridors and such like, as a result of which the wheels, when entering the bend, are guided in such grooves and/or markings.

20

According to another variant, the device according to the invention could be equipped such that it is steered entirely autonomously via markings or guiding systems, which are provided on or in the floor, in order to lift and move a bed. The device can hereby be controlled for example from a central steering unit.

25

30

In the above variant, an accompanying person only has to follow the device with the bed and thus does not need to

steer or push anymore, whereby the accompanying person only needs to intervene should a problem arise.

5 Finally, with an even more advanced steering, even the presence of an accompanying person would be no longer required as the device with the bed and patient could be followed on monitors or screens.

10 It is clear that a device according to the invention makes it possible for a bed to be moved through narrow passages such as doors, corridors and such without damaging the wall or other objects.

15 The present invention is by no means limited to the above-described embodiment represented in the accompanying drawings; on the contrary, a device for moving beds according to the invention can be made in all shapes and dimensions while still remaining within the scope of the invention.

Claims.

- 5 1. Device for moving beds, characterized in that it mainly consists of a moveable frame (2); a lifting mechanism (4) which can cooperate with the underframe of a bed (49); and a steering mechanism (5).
- 10 2. Device according to claim 1, characterized in that the device can work in conjunction with several beds.
3. Device according to claim 1, characterized in that the device is integrated in a bed.
- 15 4. Device according to any of the preceding claims, characterized in that the frame (2) consists of a first part (6) which contains the steering mechanism (5) which consists of a steering unit (7) and a drive (8) and of a
- 20 second part (9) which is made lower and narrower than the first part (6) and which contains the lifting mechanism (4).
- 25 5. Device according to claim 4, characterized in that wheels are provided under the frame (2).
6. Device according to any of the preceding claims, characterized in that the lifting mechanism (4) mainly consists of at least one pressing element (10-11) which
- 30 can be moved in a vertical plane which is controlled by means of drive means (12).
7. Device according to claim 6, characterized in that the pressing element is made up of two rollers (10-11).

8. Device according to claim 6, characterized in that the drive means (12) mainly consist of two pair of hinged arms (13-14) which are mounted on a common shaft (15) upon which also the above-mentioned pressing element (10-11) is mounted, whereby an intermediate bush (16) is provided to keep the pairs of arms (13-14) at a distance and whereby the pressing element (10-11) is maintained in place by means of nuts (17) and a motor (3) which drives the above-mentioned arms via a transmission (18).

10

9. Device according to claim 8, characterized in that the transmission (18) consists of a number of meshing gear wheels (19-20-21) which transmit the torque of the motor (3) on a horizontal rod (22) which consists of two parts (23-24) which are each provided with screw thread and which are axially situated in line, whereby a part (23 or 24) of the rod (22) hereby has a right-handed screw thread, whereas the other part (24 or 23) has a left-handed screw thread.

20

10. Device according to claim 8, characterized in that the transmission (18) consists of geared belts which transmit the torque of the motor (3) on a horizontal rod (22) which consists of two parts (23-24) which are each provided with screw thread and which are axially situated in line, whereby a part (23 or 24) of the rod (22) hereby has a right-handed screw thread, whereas the other part (24 or 23) has a left-handed screw thread.

30

11. Device according to claim 9 or 10, characterized in that on each part of the rod (22) is provided a nut (25-26) with which, via pivots (27-28-29-30), the ends of the pairs of arms (13-14) are connected freely rotatable.

12. Device according to claim 11, characterized in that the nuts (25-26) are provided with bore holes with which they are mounted in a shifting manner on guides (31-32) which are fixed with end pieces (33-34) which are in turn
5 connected to the frame (2).

13. Device according to claim 4, characterized in that the steering unit (7) mainly consists of a rod (35) and a steering rod (36) which connects the rod (35) to the
10 frame (2) of the device.

14. Device according to claim 13, characterized in that a control panel (37) with steering handle (38) is provided on the rod (35).
15

15. Device according to claim 14, characterized in that the control panel (37) is provided in a detachable manner on the rod (35).

20 16. Device according to claim 4, characterized in that the drive (8) consists of an electric motor (39) which drives a bearing roller (40).

25 17. Device according to claim 16, characterized in that the bearing roller (40) is bearing-mounted in a foot (41), whereby this foot is connected to a steering gear (42) which can rotate around a vertical shaft (44) whereby the above-mentioned bearing roller (40) is situated on the vertical shaft (44) and whereby the
30 above-mentioned drive motor (39) is mounted on the gear wheel (42) via a connecting piece (43).

18. Device according to any of the above claims, characterized in that the lifting mechanism (4) can work

in conjunction with a reversed, U-shaped element (50) provided on the underframe of a bed (49).

- 5 19. Device according to any of the above claims, characterized in that the power required for the drive of the above-mentioned motors (3-39-45) is supplied by two chargeable batteries (46-47) which are situated in the above-mentioned first part (6) of the frame (2).

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Application No: GB 9425732.6
Claims searched: 1-19

Examiner: John Wilson
Date of search: 11 April 1995

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.N): A4L[LAKC]; B7D[DAWV DAWX DBA]; B7H[HA]; B8H[H17];
B8L[LA]
Int CI (Ed.6): A61G 7/08
Other: Online database:- WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB1465007 Lanstogens etc.	1,3,5,6 at least
X	GB1310164 Korber	1,3,5,6 at least
X	GB729646 Cozens	1,4,5,6 at least
X	WO94/16935A1 Hill-Rom Co. - note figs.14-18 and p.43 line 24 to p.42 line 8	1,4,5,6, at least
X	WO87/07830A1 Norelius	1,3, at least
X	The wording of claim 1 would also appear to be anticipated by a trolley jack of well known type, having a lifting arm, fixed wheels at one end and castors for steering at the other - eg a smaller version of the device disclosed in Cozens above and commonly used in garages both commercially and at home.	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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